

Economics of carbon and forestry – the New Zealand experience

Presented at WFE/ISFRE meeting, 1-2 June 2015,
University of British Columbia
Vancouver

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Outline of talk

- New Zealand Emissions Trading Scheme – what is it?
- Response from the emitting sectors
- Response from the forestry sector
- The impact of the NZ Emissions Trading Scheme on the profitability of New Zealand commercial forestry sector.
- Government policy direction
- Is carbon sequestration through new forest establishment an answer to global climate change?
- Conclusions

New Zealand emissions trading scheme

New Zealand's main policy instrument to achieve climate change goals and obligations is the New Zealand Emissions Trading Scheme.

- “...providing a way for the New Zealand economy to meet our Kyoto obligations at the least possible cost...”
- “...to position our economy for probably deeper emission obligations in the future...”
- “...to influence near-term long-lived investment decisions through adopting the international market price for emission units...”

Article 3.3

- Annex I Parties must report emissions by sources and removals by sinks of GHGs resulting from LULUCF activities, in accordance with Article 3, paragraphs 3 and 4. Under Article 3.3 of the Kyoto Protocol, Parties decided that net changes in GHG emissions by sources and removals by sinks through direct human-induced LULUCF activities, limited to *afforestation*, *reforestation* and *deforestation* that occurred since 1990, can be used to meet Parties' emission reduction commitments.

New Zealand's commitment under Kyoto

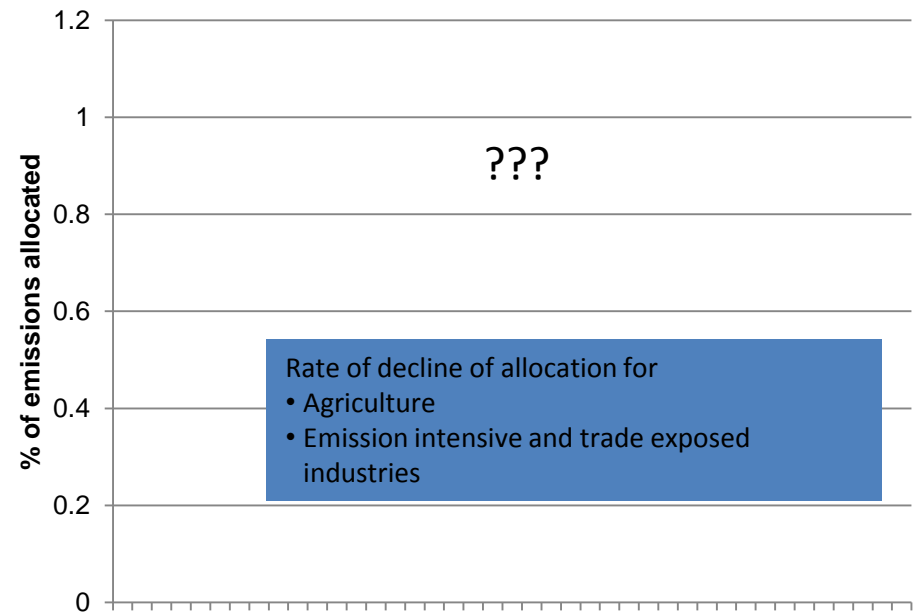
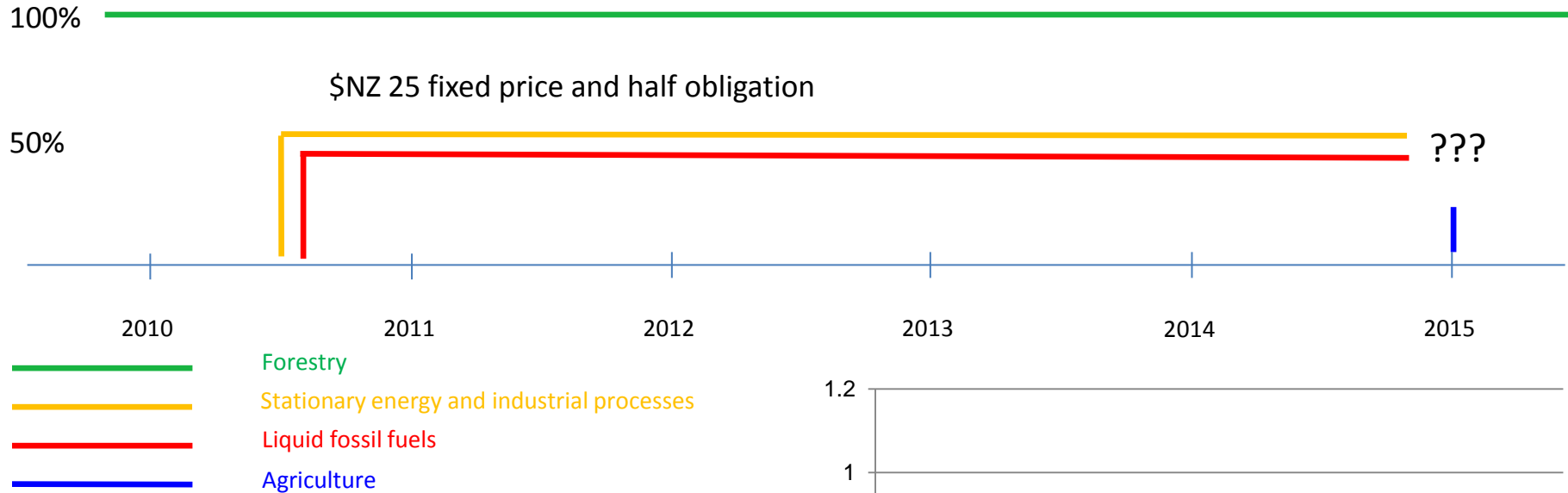


Source: Ministry for the Environment, 2014

Description of the New Zealand emissions trading scheme

- Implemented in 2008 with forestry the first sector enlisted
- Other sectors entered mid-2010
- Cap and trade scheme (some have criticised it for having no explicit cap)
- Based on the NZU, a local unit, limited ability to trade with international units. But local emitters can also surrender international units to meet emissions commitments
- An all-sectors ETS in principle, but in practice.....
 - NZs largest emitter (agriculture) is not required to participate
 - Energy-intensive and trade-exposed industries are issued credits to cover their emissions
 - Half obligation for participating emitting sectors
 - Price ceiling of \$25/tonne
 - Government is developing an auctioning system to allow it to introduce additional credits to the market

ETS – timing of entry of emitting sectors



Response of the emitting sectors

Emissions by sector

	2008	2009	2010	2011	2012	Total
Energy	34.6	31.7	31.6	31.2	32.1	161.29
Industrial processes	4.1	4.2	4.5	5.3	5.3	23.41
Solvents	0	0.03	0.03	0.03	0.03	0.15
Waste	3.9	3.8	3.7	3.6	3.6	18.63
Agriculture	33.2	33.4	33.6	34.2	35	169.32
Forestry						
Net Removals	-14.2	-12.3	-14.4	-15.5	-15.1	-71.6
<i>Deforestation</i>	3.2	5.6	4.1	3.4	4	20.2
<i>Gross removals</i>	-17.4	-18	-18.5	-18.8	-19.1	-91.8
Total	61.5	60.8	59.1	58.9	60.9	301.2

(Compared with
Assigned Amount of
302.1 million AAUs)

<http://www.mfe.govt.nz/climate-change/reporting-greenhouse-gas-emissions/nzs-net-position-under-kyoto-protocol/latest>

Sector	Gg CO ₂ equivalent		Change from 1990 (Gg CO ₂ equivalent)	Change from 1990 (%)
	1990	2012		
Energy	23,560.4	32,121.3	+8,560.9	+36.3
Industrial processes	3,303.6	5,310.9	+2,014.7	+61.8
Solvent and other product use	41.5	34.1	-7.4	-17.9
Agriculture	30,471.0	35,020.1	+4,549.2	+14.9
Waste	3,303.5	3,595.7	+289.2	+8.8
Total (excluding LULUCF)	60,641.4	76,048.0	+15,406.5	+25.4
LULUCF	-37,250.4	-26,598.3	+10,652.0	+28.6
Net total (including LULUCF)	23,391.1	49,449.7	+26,058.6	+111.4

Source: Ministry for the Environment, 2014

Early response from emitters

- Some large emitters did deals directly with land owners with existing post-1989 forest, or landowners with land that could be planted
- Large emitters bought credits "forward" to meet future obligations at a known price
- Allowed forest owners to fix price for credits in future

A16 BUSINESSDAY Thursday, May 6, 2010

■ EMISSIONS TRADING SCHEME

Westpac targets NZ foresters for carbon trading market

Westpac says it has begun buying carbon offsets from New Zealand forest owners with the aim of selling them to big polluting firms as part of New Zealand's emissions trading scheme.

The bank has approached about 600 foresters to pool carbon offsets issued to them to sell in large lots to firms such as refiners and cement makers that will have to meet carbon costs under the scheme.

New Zealand's ETS, only the second national scheme outside Europe, starts on July 1 with the entry of power generators, transport and steel and cement makers, which emit about half of the nation's greenhouse gas pollution.

"We've done some deals," Lloyd Cartwright, head of New Zealand financial markets for Westpac Institutional Bank, said. He declined to give specific details.

"You can see the deals in the market and nothing is going through near \$25," Cartwright said, referring to the scheme's initial capped price.

Marie Taylor

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Nitrogen and carbon have been sold in a new precedent-setting deal to convert pastoral land in the Lake Taupo catchment back to forestry.

In the next four years 550ha of pastoral land will be planted in radiata pine says Puketapu 3A Incorporation chairman John Hura, but he expects this to climb to 800ha.

The sale also involves the Lake Taupo Protection Trust buying 22 tonnes of nitrogen back from the farm as part of its moves to reduce nitrate levels in the lake.

Currently the trust is paying around \$400/kg for nitrogen and this price makes the nitrogen component of the deal worth around \$8.8million to Puketapu 3A.

Hura would not comment on the value of the deal, but said the committee has not made decisions about investing the proceeds yet.

The incorporation has also sold the carbon credits from the new 550ha forest to state owned enterprise Mighty River Power for an undisclosed price, likely to be around \$25/tonne.

Buying NZUs forward

MIGHTY RIVER POWER

CARBON CREDIT SUPPLY TENDER

LAND OWNERS: ENHANCE RETURNS FROM NEW OR EXISTING FORESTRY DEVELOPMENTS

Mighty River Power invites New Zealand-based entities to submit proposals for the long term supply of carbon credits from existing or new forestry developments.

PREFERRED TERM: 15 years

PREFERRED QUANTITY: 15,000 units per annum (circa 250 ha)

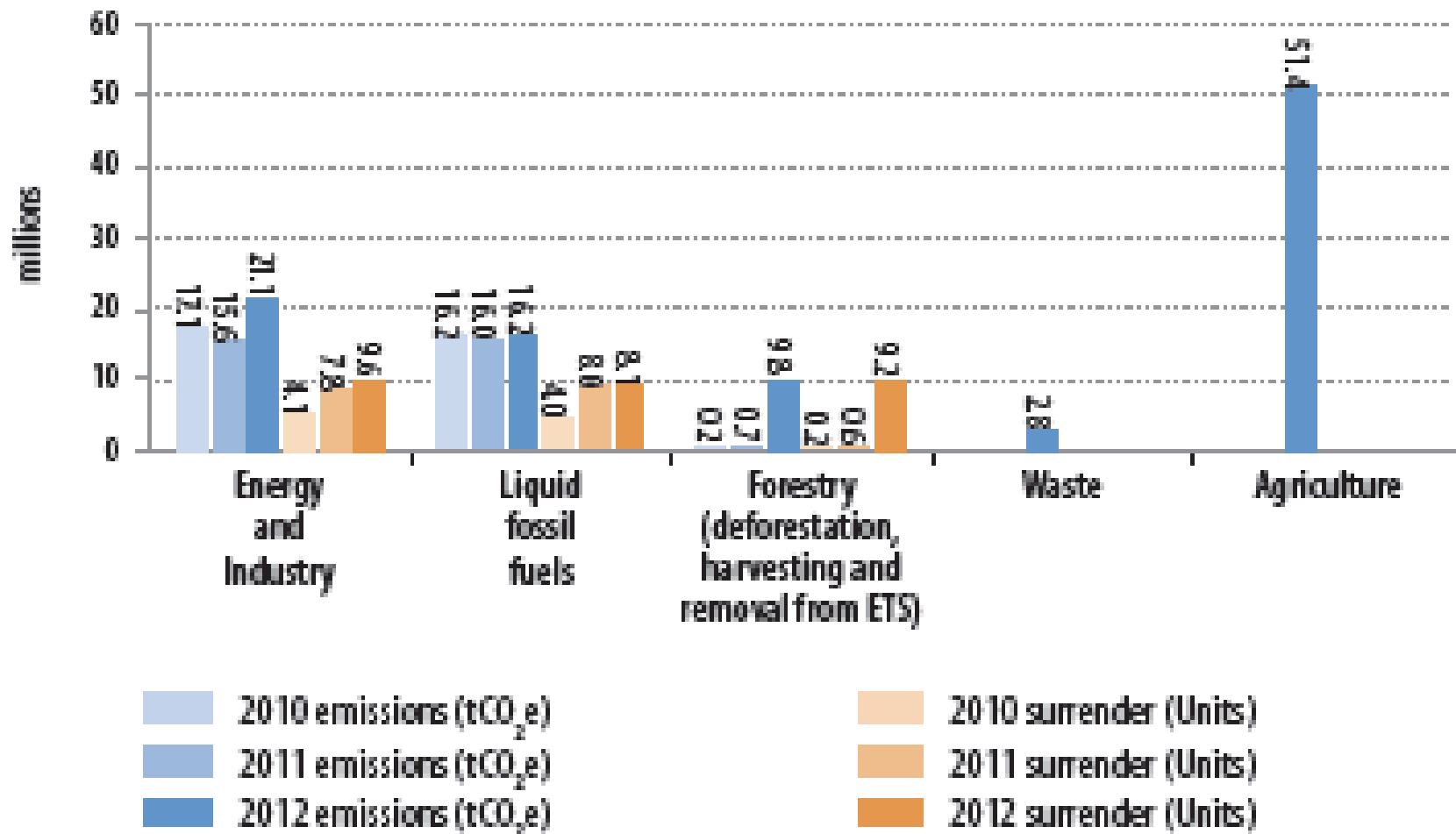
Expressions of interest by 26 August 2010

For more information about this opportunity phone
Bruce Miller, Head of Wholesale Markets, Mighty River Power,
07 857 0185, email Bruce.Miller@mightyriver.co.nz

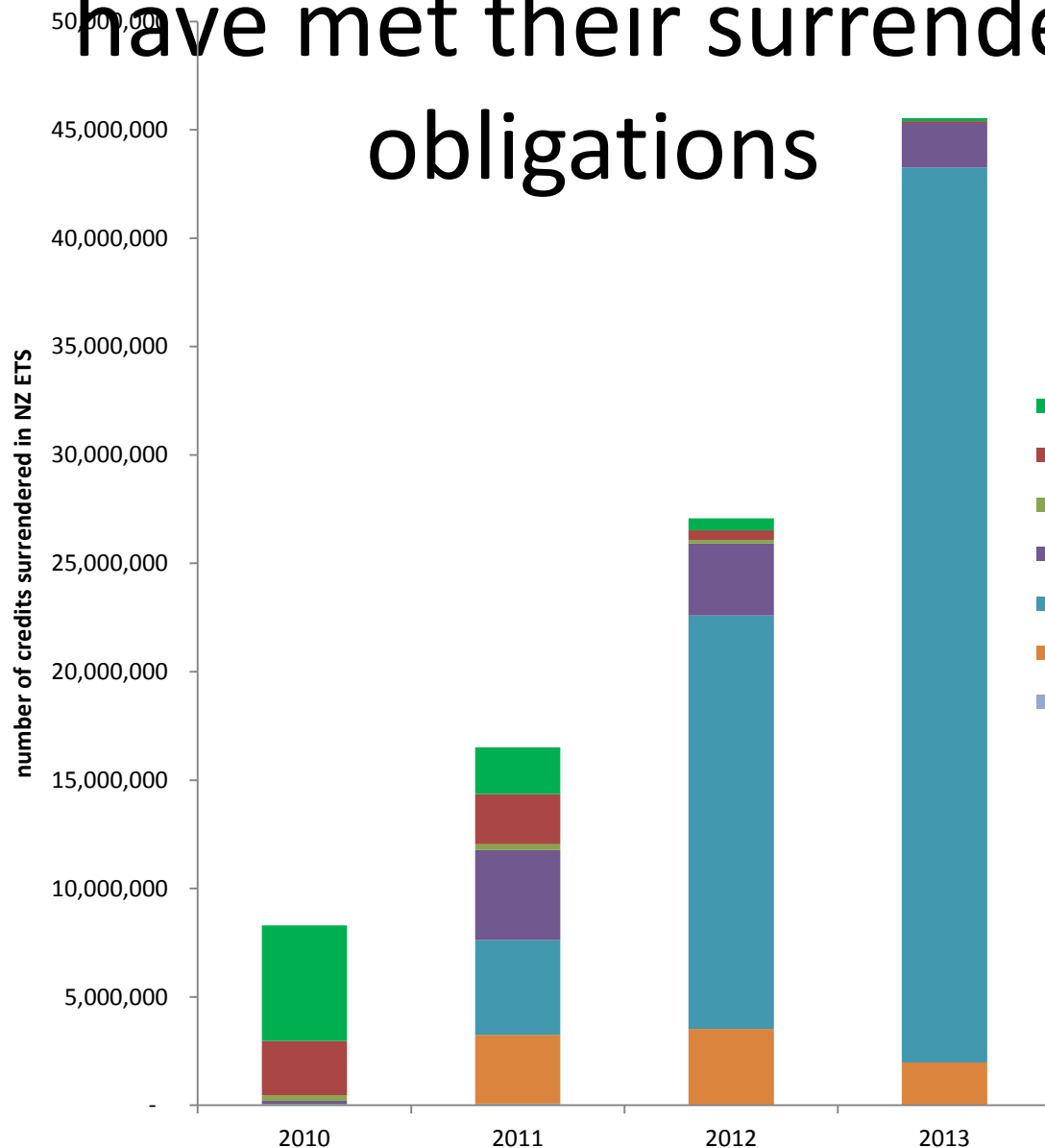
www.mightyriver.co.nz

→ 2010, 2011 and 2012 emissions and surrenders

FIGURE 5



How participants in the ETS have met their surrender obligations



Forestry NZUs

Other NZUs

NZ AAUs

CERs

ERU

RMU

Fixed price

These are NZUs given to foresters in the ETS. They may be converted to NZ AAUs for offshore sale.

These are all other NZUs, including those given to Industrial Allocation recipients. They cannot be converted to NZ AAUs for offshore sale.

New Zealand based AAUs can be either:

- Forestry NZUs that have been converted into NZ AAUs; or
- NZ AAUs that have been granted to companies in New Zealand that have participated in the Projects to Reduce Emissions (PRE) or the Permanent Forest Sink Initiative (PFSI).

CERs are units generated by Clean Development Mechanism (CDM) projects offshore. These units are able to be purchased by participants in the ETS and used to meet their surrender obligations.

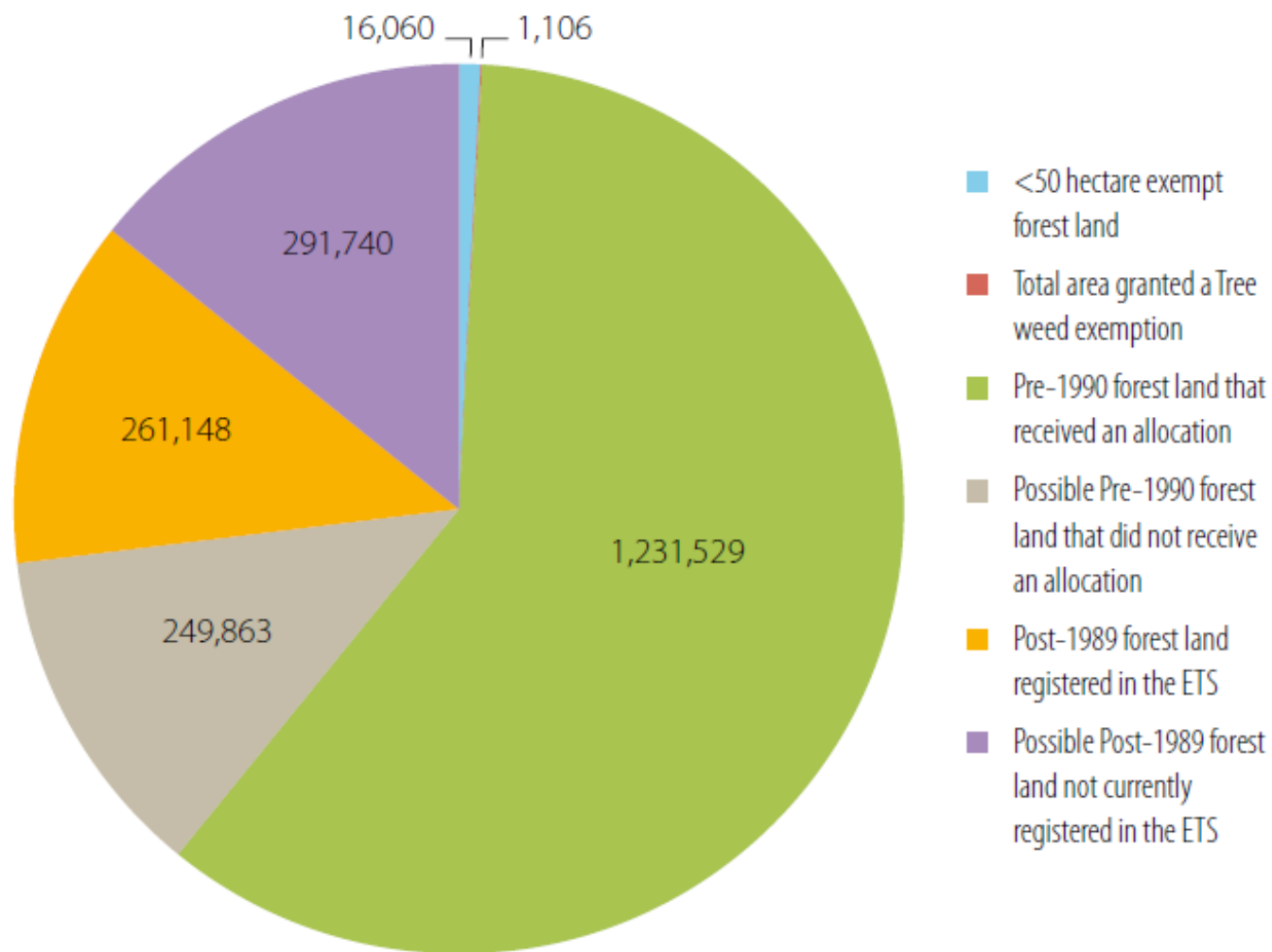
ERUs are units generated by Joint Implementation (JI) projects. These units are able to be purchased by participants in the ETS and used to meet their surrender obligations.

RMUs are Kyoto Protocol units generated through storing carbon in trees. These units are able to be purchased by participants in the ETS and used to meet their surrender obligations.

Companies have the option to pay the Government a NZ \$25 fixed price per unit to be surrendered, rather than surrender the other types of eligible units.

Response of the forestry sector

FIGURE 3: Distribution of forest land (in hectares) under the ETS



Source: EPA (2014)

Net change in commercial forest area



Source: Ministry for Primary Industries and the Ministry for the Environment

Source: EPA (2014)

Survey of deforestation intentions (thousand hectares)

	2008	2009	2010	2011	2012	2013 to 2020		2008 to 2012	2008 to 2020
ETS (large-scale owners only)	4	5	4	4	6	39		23	62
ETS (all owners)	6	6	6	6	8	55		32	87
No ETS (large-scale owners only)	4	5	4	4	6	36		23	59
No ETS (all owners)	6	6	6	6	8	52		32	84

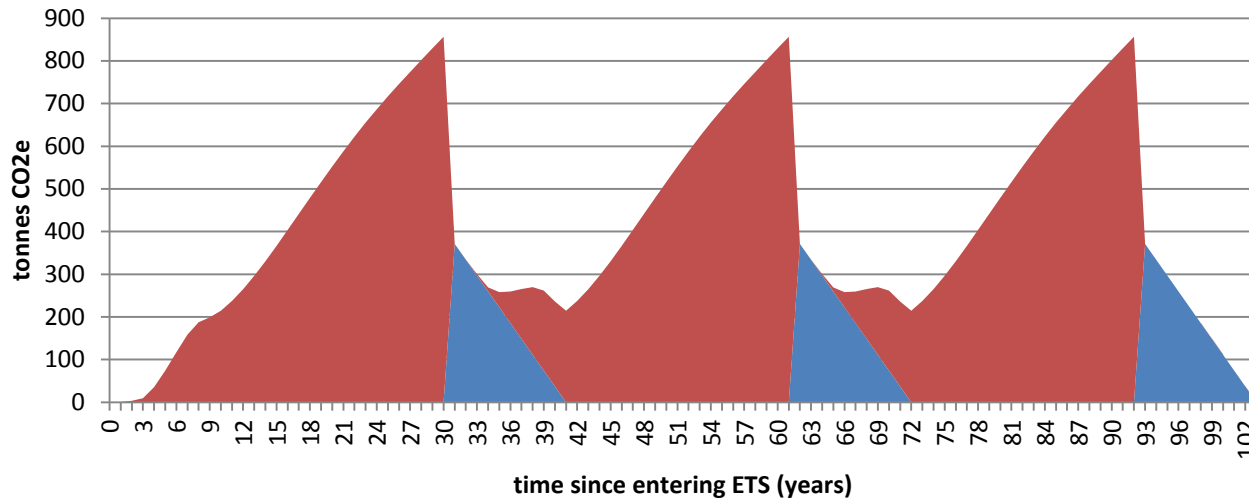
Source: Manley (2013)

Impact of the ETS on forestry profitability

Impact of the ETS

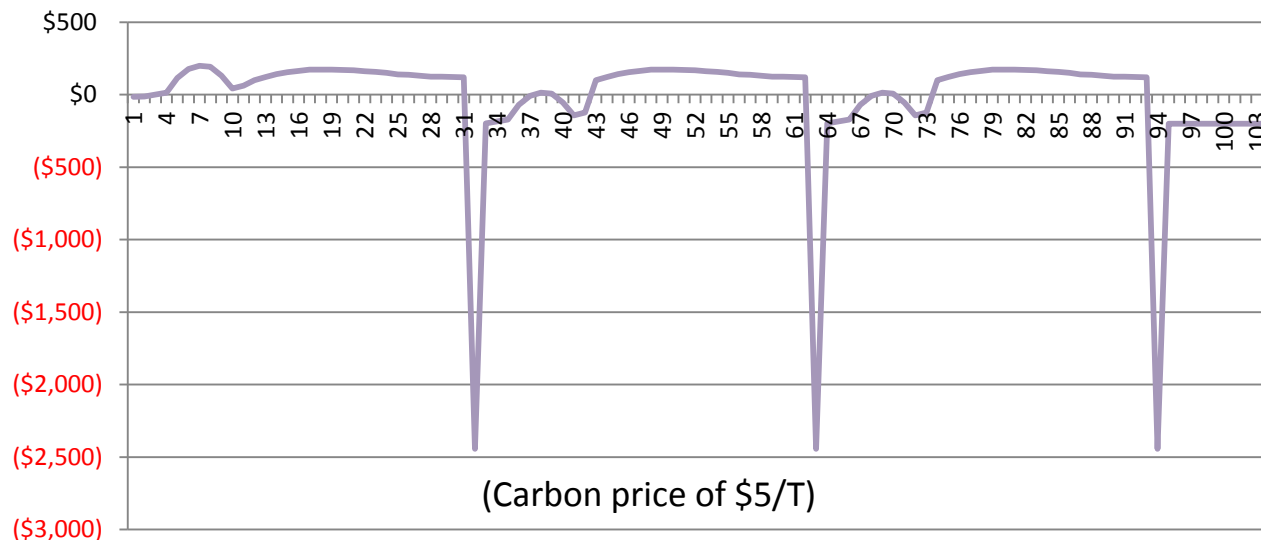
- “...Owners of pre-1990 forest land that exceeds 50 ha and any ETS participants occupying post-1989 forest land that enters the ETS, effectively have a contract with the Crown to maintain forest or surrender carbon units. This requirement potentially impose a financial impost on any owner of such land in the event that the owner wishes to change the land use...”

A forest owner who enters the ETS earns NZUs based on sequestration of CO₂e

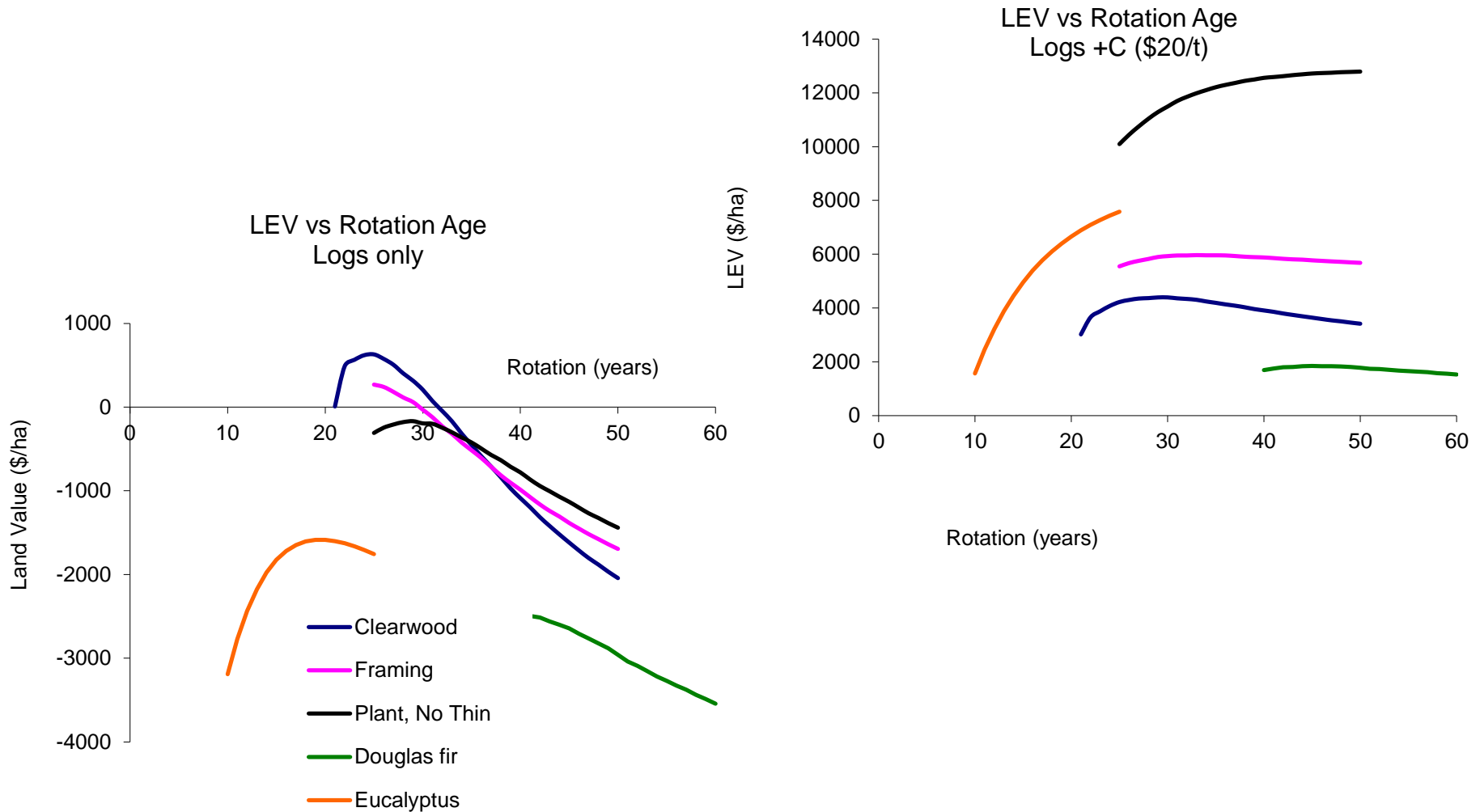


Net stock of carbon in a radiata pine forest

If a single age-class forest owner participates in the ETS the cash flows from the sale of NZUs (carbon credits) follow this pattern. Incremental carbon earns credits and harvesting generates obligations to surrender carbon, driven by the change in carbon stock

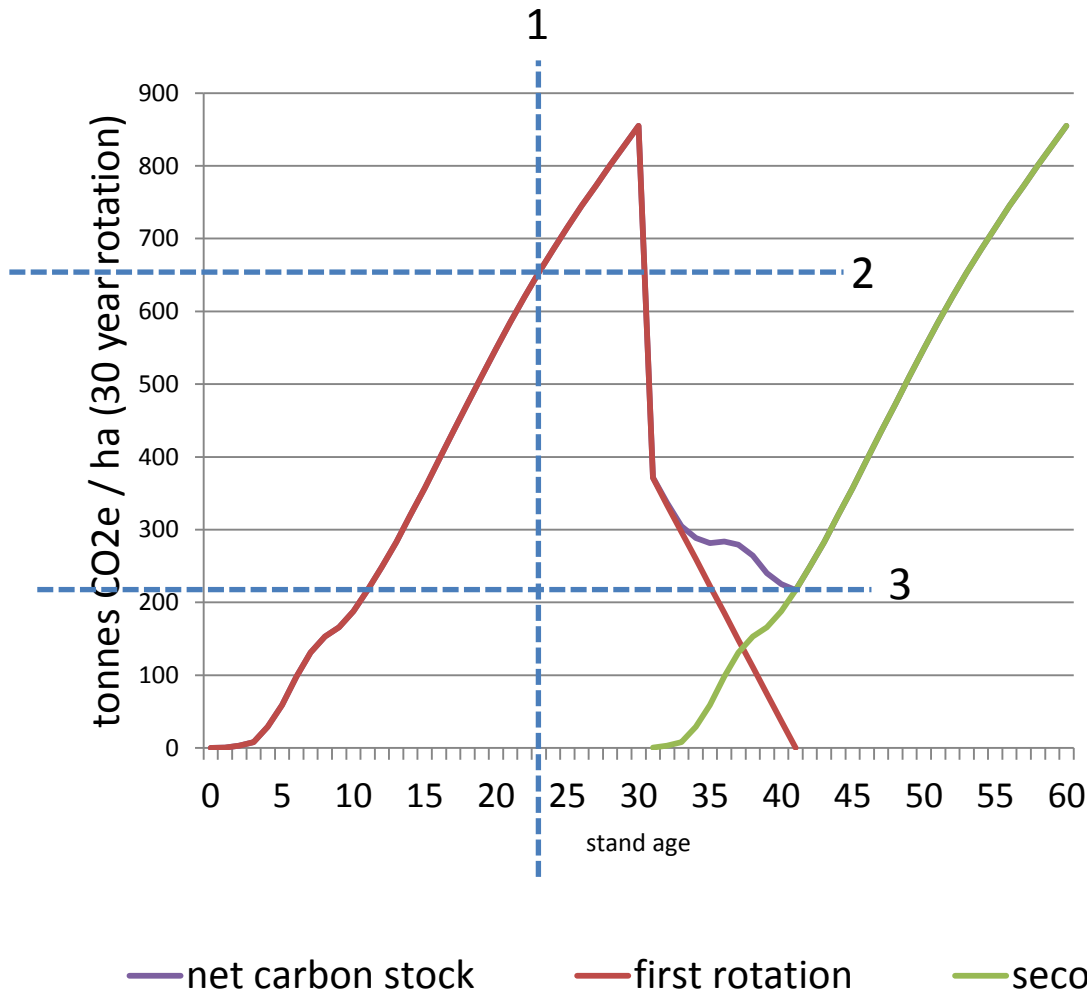


Effect of ETS on forestry profitability



Source: Bloomberg, M. MAF ETS Workshops, June 2010

Rules of ETS

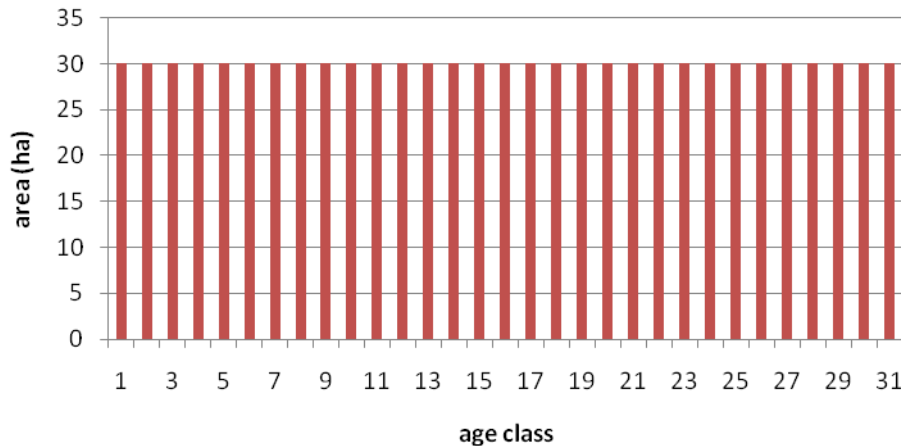


You are only liable for carbon that you have previously earned. This is the “afforestation reforestation debit credit (ARDC) rule” otherwise known as the “fast forest fix”. This has been retained in the NZ ETS, but dropped in international climate change negotiations

This rule means that the earnings from entering an existing forest into the ETS are different to entering a new forest into the ETS

Enter normal forest into ETS

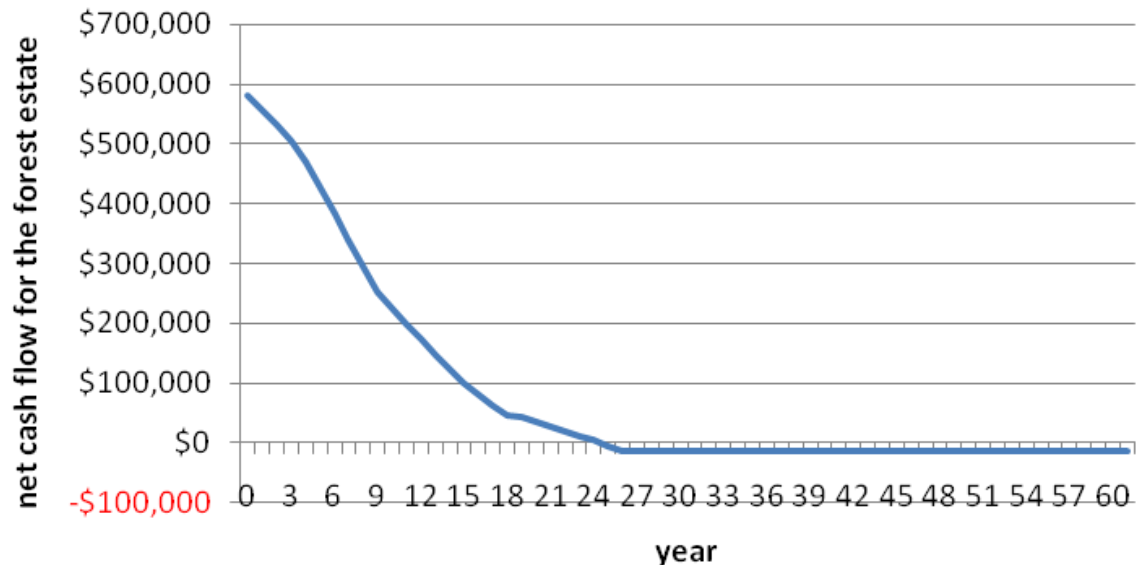
Area / age class distribution



The afforestation reforestation debit credit (ARDC) rule has been retained in the NZ ETS (although removed during the Durban negotiations for the Kyoto replacement).

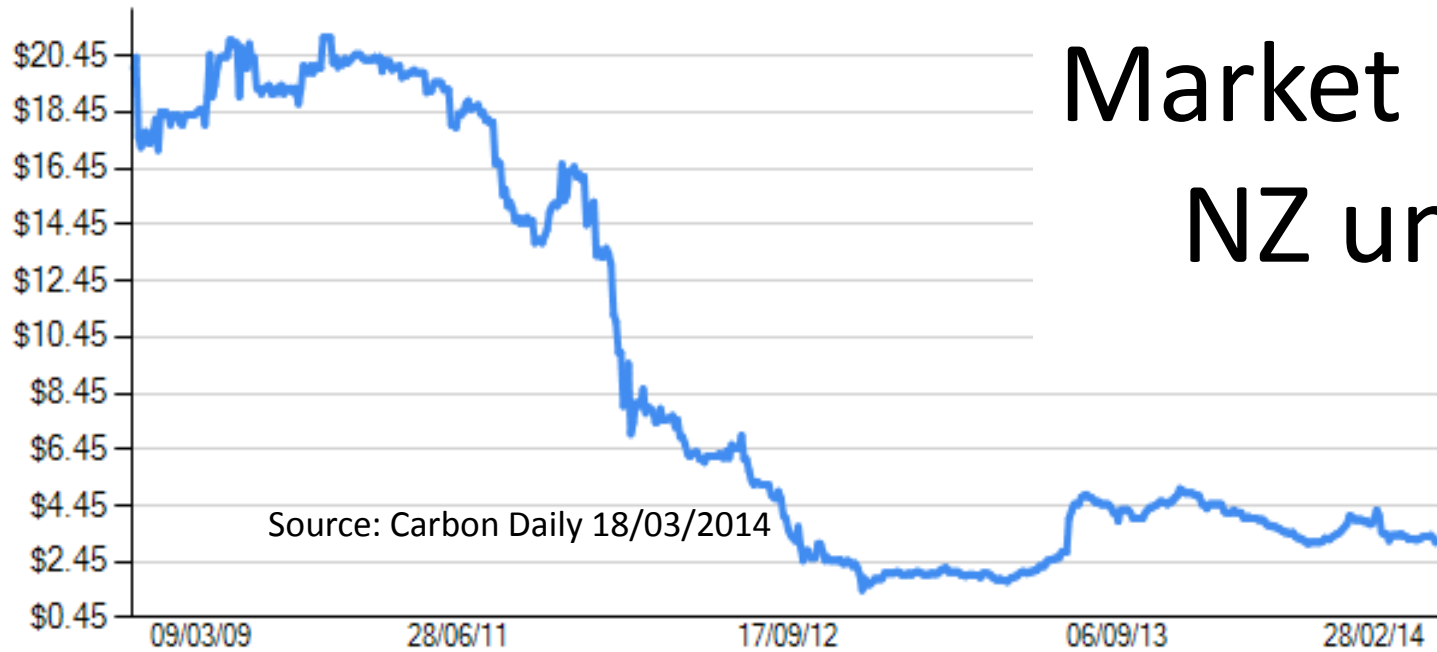
Carbon cash flows decline as carbon liabilities increase each year. Eventually, liabilities equal annual earnings, and there is no further benefit to participation in the ETS. Compliance costs actually provide a small dis-benefit

Carbon cash flow



PRICE HISTORY

SPOT NZUS



Source: Carbon Daily 18/03/2014

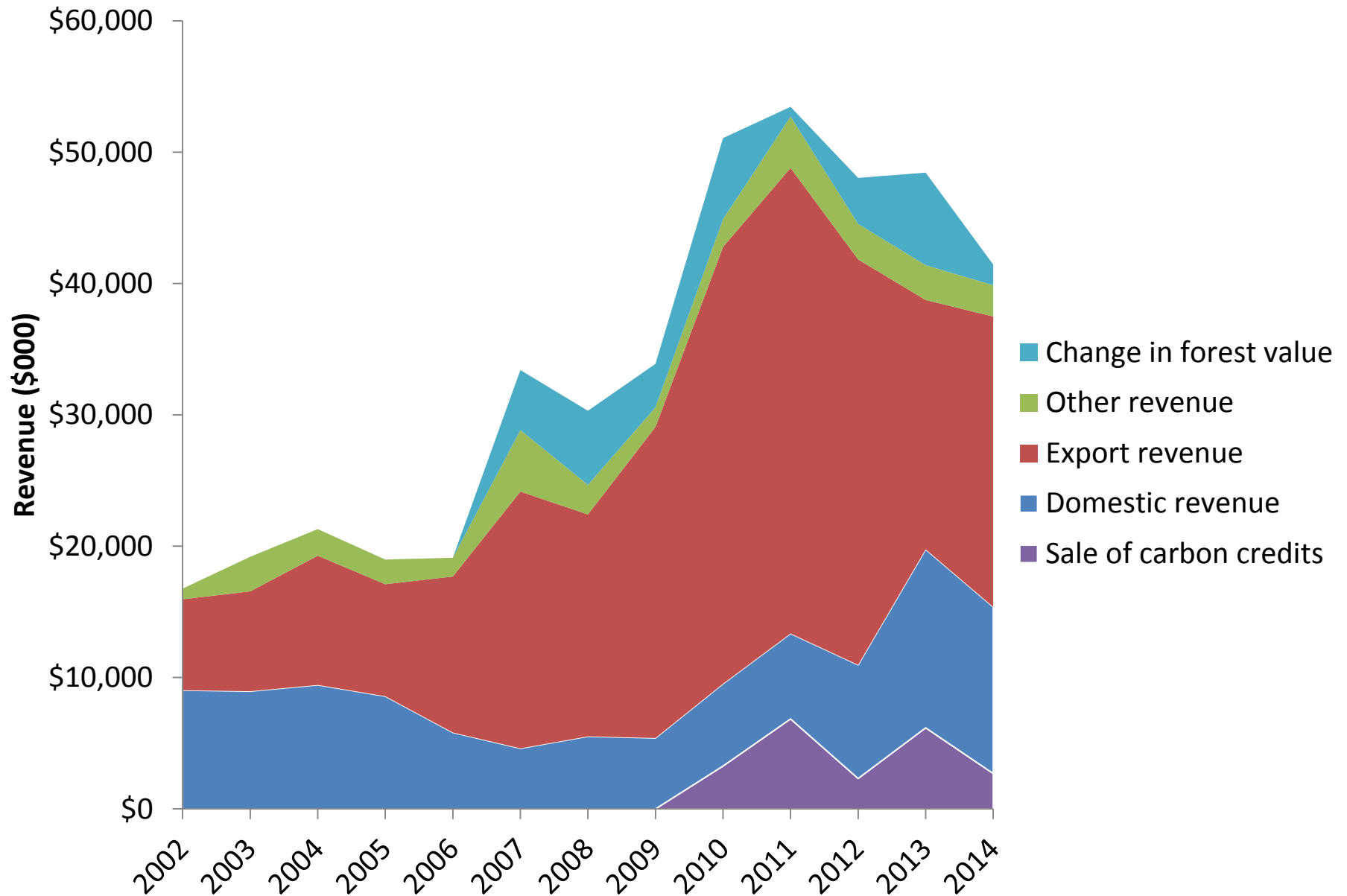
Market price, NZ units



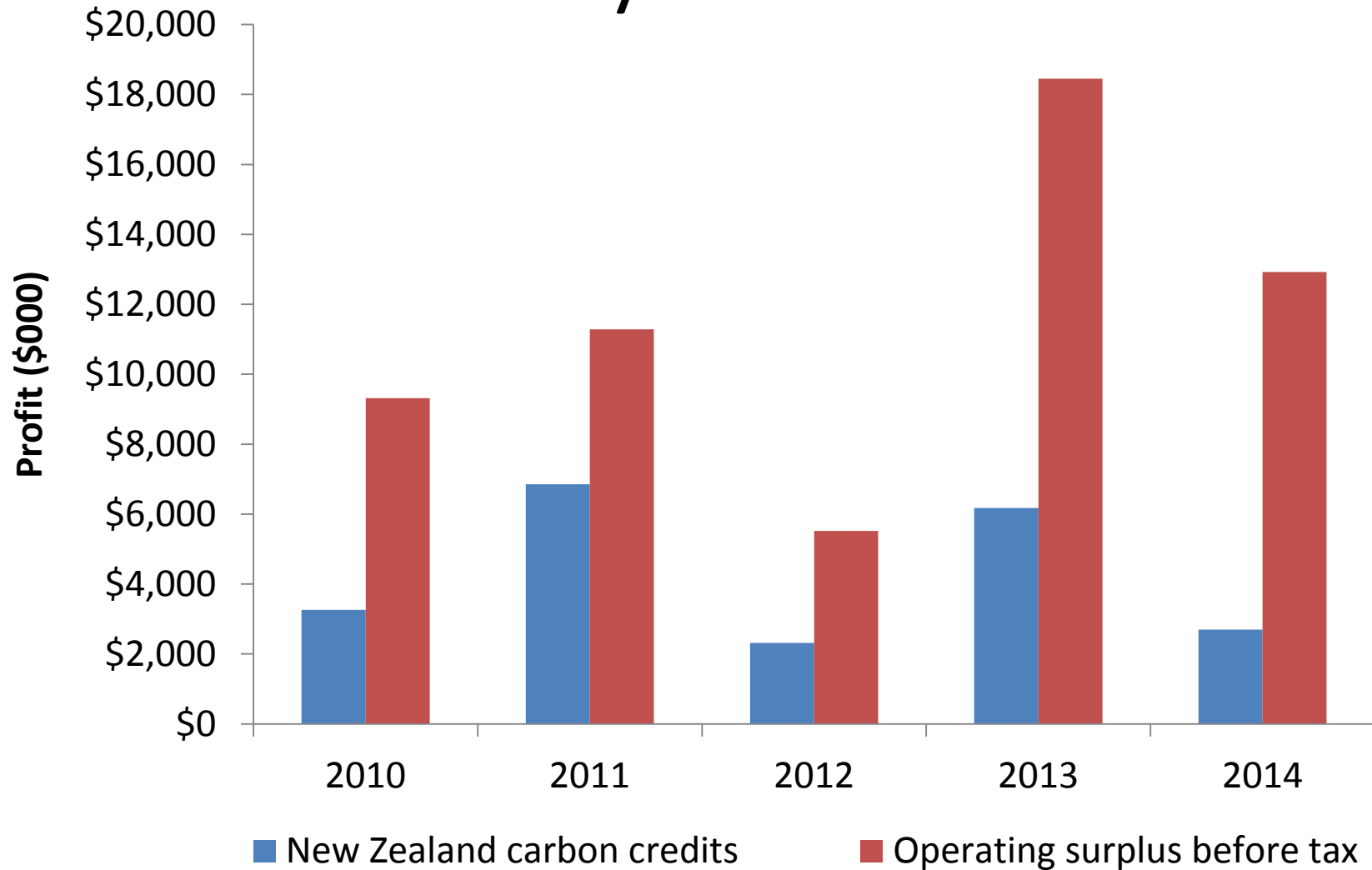
What determines the impact of ETS on profitability?

- Structure of forest
- Time since entering the ETS
- Price of NZUs
- Risk appetite of grower
 - Proportion of credits surrendered
 - Species and silviculture

Sources of revenue, City Forests Ltd



Contribution of carbon to profitability, City Forests Ltd



from City Forests Annual Report 2014

During the year the Company purchased and surrendered ERU carbon credits at favourable prices to withdraw the majority of its post 1989 forests from the New Zealand Emissions Trading Scheme. The purpose of this transaction was to reduce future harvest liabilities. The Company intends to re-register these post-1989 forest areas in the coming financial year. The Company has retained its higher value NZU carbon credits and has recorded a gain in the value of these credits as the market price increased throughout the year. No other significant Carbon transactions occurred during the year.

Carbon revenues may once again become a contributor to Company performance should carbon prices recover from current levels although this has not been included in financial forecasts. Carbon revenues provide financial recognition of the company's wider positive environmental impact.

Summary: \$\$ from the ETS

- A forest that is supplying timber products will tend towards a normal forest. This type of forest has only an initial financial benefit from participation in the ETS.
- If you have a single age-class forest, and are risk averse, you might only claim “safer carbon”. This is also an initial financial benefit only which is not repeated in second and subsequent rotations
- If you have a single age class forest and you trade NZUs right through each rotation you are also making a return on the time value of credits earned above the safer carbon level.
- Can manage carbon liability risk by growing a higher-value timber crop. This will also tend to reduce carbon returns.
- Carbon returns will always be dependent on the age of the forest when entering the scheme. Entering a newly planted forest maximises returns
- There is a “slow start” to cashflow generation – don’t get much from the first three years after planting
- While the NZ ETS entails payment for an environmental service (the sequestration of carbon) it also encumbers forestry land with a contingency liability with an uncertain value

Government policy direction

The government is finalising its position for the next round of negotiations...

- *The rules that will apply on forests and land-use change.* Given the significance of the land sector to New Zealand, these rules are particularly important to us as they can considerably affect the cost of our target.
- *Technology.* Uncertainties surrounding future technology, particularly in agriculture, will affect our ability to transition to a lower-carbon future. While we are starting to see promising opportunities, their commercial viability is not yet clear.
- *Access to international carbon markets.* It is not clear if the agreement will recognise the use of markets to meet contributions, and how they will operate. Given we have fewer low-cost options to reduce domestic emissions, emissions reductions overseas have been crucial to meeting our current targets.
- *The future international carbon price* that will affect the cost of our target.

Why the government likes international credits

	Actual	
	30 June 2014 \$m	30 June 2013 \$m
Provision for ETS credits		
Opening provision	179	375
New provision recognised during the period (ETS expenses)	46	55
Provision used during the period (ETS revenue)	(13)	(40)
Transfer of units to Kyoto provision	24	24
(Gains)/losses on NZ Units	285	(235)
Closing provision	521	179

The Emissions Trading Scheme (ETS) was established to encourage a reduction in New Zealand's greenhouse gas emissions. The ETS creates a limited number of tradable units (the NZ Unit) which the Government can allocate freely. The allocation of NZ Units creates a provision (and an expense if allocated for free).

The provision is reduced, and revenue recognised, as NZ Units are surrendered to the Crown by emitters.

The carbon price used to calculate the ETS provision is \$NZ4.17 (30 June 2013: \$NZ1.80).

The carbon price has been determined by the Ministry for the Environment based on the lower of the quoted NZU spot price at 30 June, and the monthly average NZU spot price as published by Point Carbon.

The price methodology will continue to be reviewed as the market for NZ Units develops.

The transfer of 65.3m units equating to NZ\$24 million to the Kyoto Provision relates to international units surrendered by participants.

Credits acquired at a value of 37 cents per tonne

What are the Kyoto rules for carry-over of units between commitment periods?

- AAUs can be carried over without limitation.
- CERs and ERUs converted from AAUs may be carried over, up to a limit of 2.5% of New Zealand's assigned amount for each of these two units. The total combined carry-over is not allowed to exceed 5% of the initial assigned amount of Kyoto units. Based on New Zealand's initial assigned amount of Kyoto units, this equates to approximately 15 million units: 7.5m CERs and 7.5m ERUs respectively. Kyoto rules specify that any CERs and ERUs above this 2.5% threshold are cancelled.
- RMUs, tCERs and ICERs and ERUs from LULUCF projects may not be carried over.

Net position as at April 2015

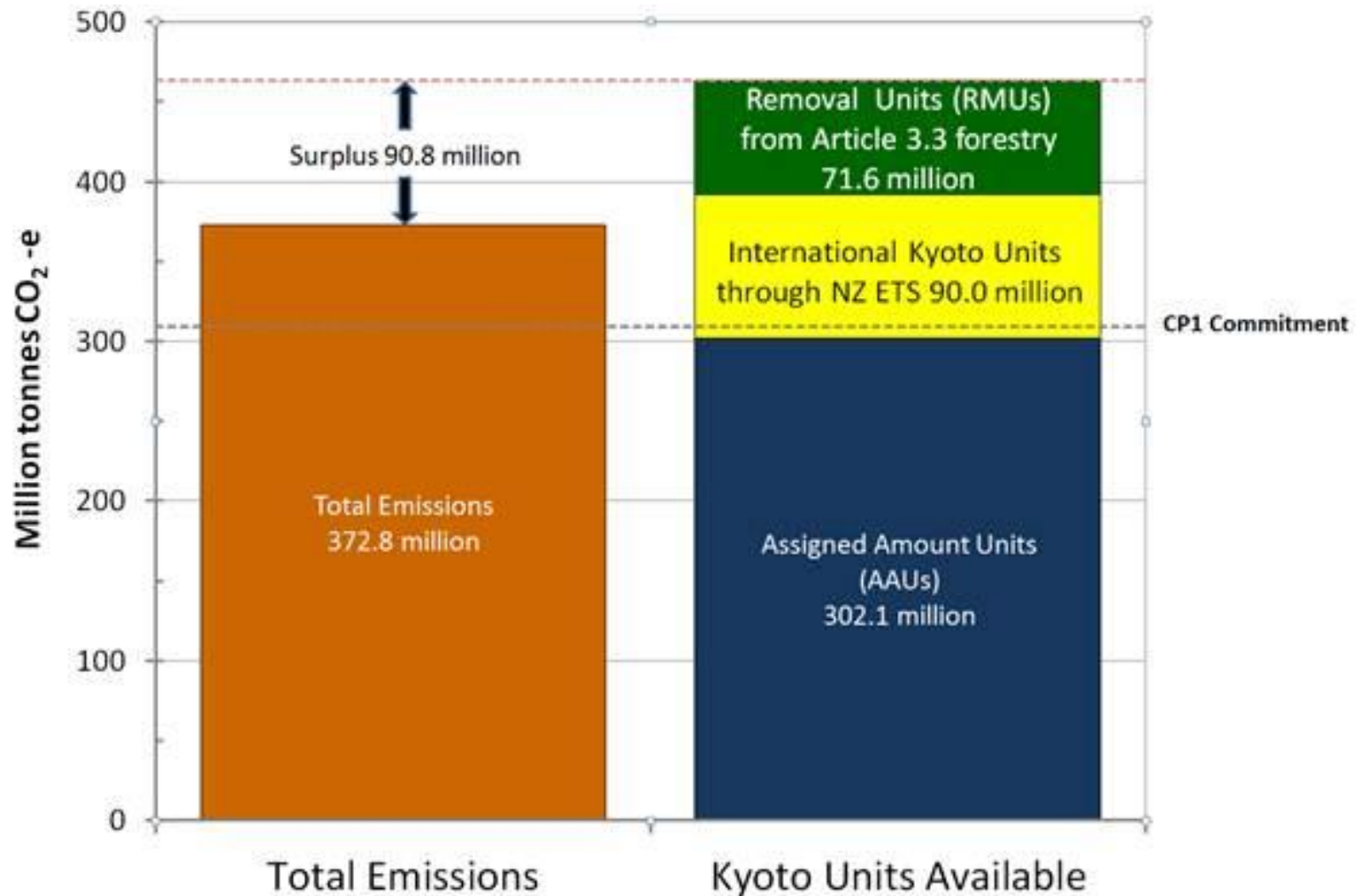
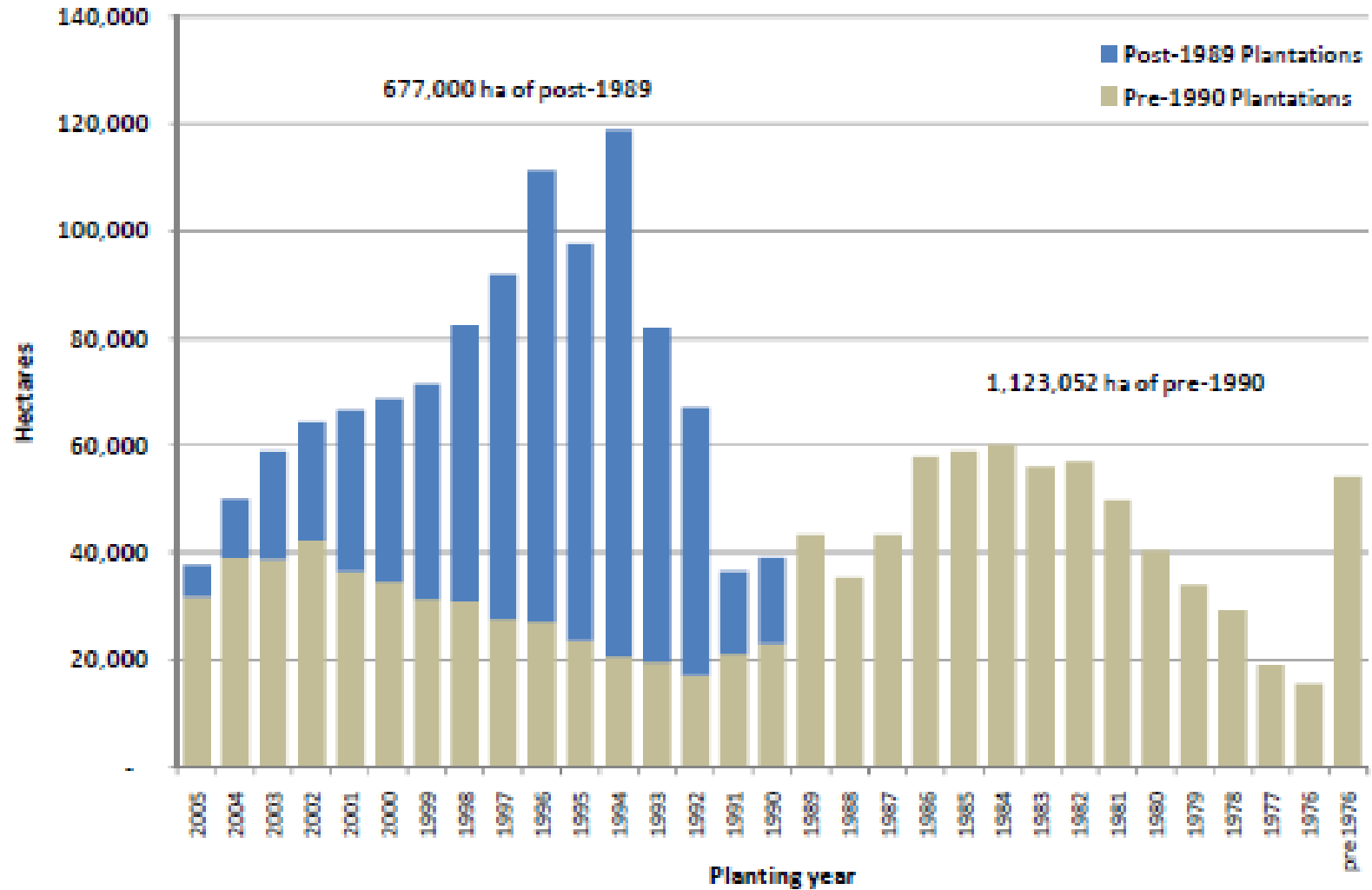


Figure 1 Plantation forests (as at 1 April 2006)



Source: MAF National Exotic Forest Description 2006

Source: Scrimgeour and Denne, 2008

Strategic role of forests

Is carbon sequestration through new forest establishment an answer to global climate change?

- In the period to 2050 afforestation and other technologies that rely on biological systems – have been found to be the only potentially significant contributors to reducing carbon emissions
- the numbers for forestry are significantly more conservative than what can be achieved with fast growing plantations
- A viable way of providing time to implement measures to move to a low carbon economy

NETS, or “negative emissions technologies”

NETs	Description	Storage medium	Estimated cost	Sequestration potential 2020-2050
Afforestation	Planting forests or managing to enhance uptake	Biomass and soil carbon	\$20-\$100 / t CO ₂ e	30 Gt CO ₂
Agricultural land management	Changing land management practices to increase organic carbon in soils	Soil organic carbon	Cost negative to \$100/tCO ₂ e	39 Gt CO ₂
Biochar	Converting biomass through pyrolysis, to a stable product that is added to soil	Stable char products in soils	\$0-\$135 / t CO ₂ e	33 Gt CO ₂
Bioenergy with carbon capture and storage	Capturing and storing carbon emitted from biomass combustion or conversion	Supercritical CO ₂ in geological storage	\$45 - \$250 / t CO ₂ e	15 Gt CO ₂

Source: Caldecott et al. (2015)

What is the “cost of production” in NZ?

The Afforestation Grant Scheme provided funds to establish new forest, and means for the government to acquire the rights to the carbon from the first ten years of growth of that forest.

Age	Carbon increment (tonnes CO ₂ e)
1	0.4
2	1.6
3	4
4	18
5	27
6	33
7	34
8	25
9	12
10	14

- Using the average Afforestation Grant of \$1868/ha, the breakeven carbon price (to make exactly 7% on the investment) is an average price of \$18/tonne
- Use of a higher discount rate would increase the breakeven value
- If carbon yields were conservative the breakeven carbon price would be lower

Conclusion

Conclusions

– impacts on forestry profitability

- Carbon market prices tend to rise and fall with the local and global economy. This may not align with GHG commitments or aspirations of a particular country.
- Carbon prices are currently too low in New Zealand to encourage new forestry planting, and the rapid decline in carbon prices may have reduced confidence in the market.
- There is inherently a slow start to earnings for new forests, so need to have confidence in the long term viability of the market.
- Allowing international credits to be used to meet emissions obligations under the NZ ETS has reduced the demand for forestry NZUs to nearly zero
- The ETS has rendered pre-1990 forests “2nd class forests”. There is an incentive for owners of these forests to change land use while carbon prices are very low, even if they re-forest later.
- Carbon liabilities reduce the liquidity of forest land as an asset class
- Based on New Zealand’s experience to date, an emissions trading scheme is not the answer either a profitable forestry sector, or a low carbon future
- The generally transitory nature of the economic benefits of the ETS to the forestry sector are inherent in the design of the scheme.

An appropriate role for forestry

- A profitable and expanding forestry sector will reduce net emissions up to a point in time.
- From then on, a profitable forestry sector will contribute by maintaining carbon sinks, the industry will derive most of its energy requirements from sustainable sources (that is, wood waste), and a number of forestry products (sawn timber, roundwood and wood based panels) contribute to longer term carbon storage

3 main conclusions

- While forests planted in the 1990s in New Zealand have played a significant role in NZ meeting its Kyoto commitments, the NZ ETS has not stimulated planting of new forests, for a number of reasons, including
 - price uncertainty increasing investment risk
 - Long term carbon liabilities
 - financial benefits are finite (around 20 years) for most forest owners
- Government's implementation of the ETS has focused largely on the objective of meeting NZ's Kyoto objectives at minimum cost
 - The NZ ETS has been very effective at attracting international credits that the government can use to offset the longer term liabilities inherent in using RMUs (earned from planted forest carbon sequestration) to meet current commitments
- Planting new forest is the most feasible and cost-effective technology for removing carbon dioxide from the atmosphere, and could be implemented on a significant scale.
 - But the current implementation of government policy is not effective at mobilising this capability

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